

# A journey through the secret history of the Flying Geese Model

著者	Kumagai Satoru
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雑誌名	IDE Discussion Paper
巻	158
発行年	2008-06-01
出版者	Institute of Developing Economies (IDE-JETRO)
URL	<a href="http://hdl.handle.net/2344/775">http://hdl.handle.net/2344/775</a>

IDE Discussion Papers are preliminary materials circulated  
to stimulate discussions and critical comments

IDE DISCUSSION PAPER No. 158

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Satoru KUMAGAI\*

June 2008

### **Abstract**

Economic development in East Asia is characterized by the sequential “take-off” of member countries. This multi-tiered economic development in East Asia is often termed the “Flying Geese” pattern of economic development. However, some authors argue that the traditional Flying Geese pattern is not applicable to some industries such as electronics. Here, Japan may no longer be the sole “leading goose”, with “followers” such as China (now producing cutting-edge products) having “caught-up”. Does this mean that the Flying Geese Model has become “obsolete” in the 21st century? The main objective of this paper is to clarify the two concepts of Flying Geese which now seem confused: (1) application of the pattern of economic development in one specific country, and (2) application of the pattern of economic development to multiple countries in sequence. This paper provides validity checks of Flying Geese Models after differentiating these two concepts more clearly.

**Keywords:** Flying Geese Model, East Asia

**JEL classification:** O10, F19, N75

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\* Researcher, Economic Integration Studies Group, Inter-disciplinary Studies Center,  
IDE (kumagai@ide.go.jp)

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**INSTITUTE OF DEVELOPING ECONOMIES (IDE), JETRO**  
**3-2-2, WAKABA, MIHAMA-KU, CHIBA-SHI**  
**CHIBA 261-8545, JAPAN**

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# A Journey Through the Secret History of the Flying Geese Model

Satoru KUMAGAI\*

## Abstract

Economic development in East Asia is characterized by the sequential “take-off” of member countries. This multi-tiered economic development in East Asia is often termed the “Flying Geese” pattern of economic development. However, some authors argue that the traditional Flying Geese pattern is not applicable to some industries such as electronics. Here, Japan may no longer be the sole “leading goose”, with “followers” such as China (now producing cutting-edge products) having “caught-up”. Does this mean that the Flying Geese Model has become “obsolete” in the 21st century? The main objective of this paper is to clarify the two concepts of Flying Geese which now seem confused: (1) application of the pattern of economic development in one specific country, and (2) application of the pattern of economic development to multiple countries in sequence. This paper provides validity checks of Flying Geese Models after differentiating these two concepts more clearly.

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\* Researcher, Economic Integration Studies Group, Inter-disciplinary Studies Center, IDE  
(kumagai@ide.go.jp)

## 1 Introduction

Economic development in East Asia is characterized by the sequential “take-off” of member countries. First, Japan succeeded in modernizing its economy after the *Meiji* Restoration during the latter half of the 19th century. Japan continued to develop its economy for a century, despite the interruption by World War II, and became virtually the sole developed country in Asia in the 1960’s.

The second wave of industrialization in East Asia started in the Asian NIE’s or the “four tigers” (Taiwan, South Korea, Hong Kong, and Singapore) during the 1960’s, and leading ASEAN countries (Malaysia, Thailand, the Philippines, and Indonesia) then followed.

The third wave of industrialization in East Asia in the 1990’s was led by China after the Economic Opening of 1994. India and some late arriving ASEAN countries such as Vietnam then followed.

This multi-tiered economic development in East Asia is often termed the Flying Geese pattern of economic development. Akamatsu (1935, 1937, 1962) originally developed the concept of Flying Geese. Most notably, Kojima (1960, 1970, 1995) then elaborated on the concept and expanded it further.

Some authors argue that the traditional Flying Geese pattern is not applicable to some industries such as electronics. In this industry, Japan is no longer the sole “leading goose”, but some followers like China (now producing cutting-edge products) have caught up. Does this mean that the Flying Geese Model has become obsolete in the 21st century?

In this paper, the historical development of the Flying Geese Model and its variants are re-introduced and assessed relative to empirical quantitative data to determine whether or not the model and variants are still valid. This paper thus has two objectives: One is to clarify two concepts of the Flying Geese that seem now to be confused. One concept involves the application of the pattern of economic development in one specific country, and the other involves application of the pattern of economic development in multiple countries in sequence. Because of the confusion of these two

concepts, the debate on the validity of the Flying Geese Model is also quite confused. Thus, the second objective of the paper is to provide validity checks of Flying Geese Models after differentiating the two concepts more clearly.

The paper is structured as follows: The original Akamatsu Flying Geese Model and its variant are introduced in Chapter 2. Empirical evidence is then presented in Chapter 3 to check the validity of these models. Chapter 4 concludes the paper by revisiting the original Akamatsu Flying Geese model and interpreted in the context of East Asia in the 21st century

## **2 The Flying Geese Model**

Kojima (2000, p. 385) explains the Flying Geese Model by citing the famous speech of Saburo Okita, an economist and a former foreign minister of Japan:

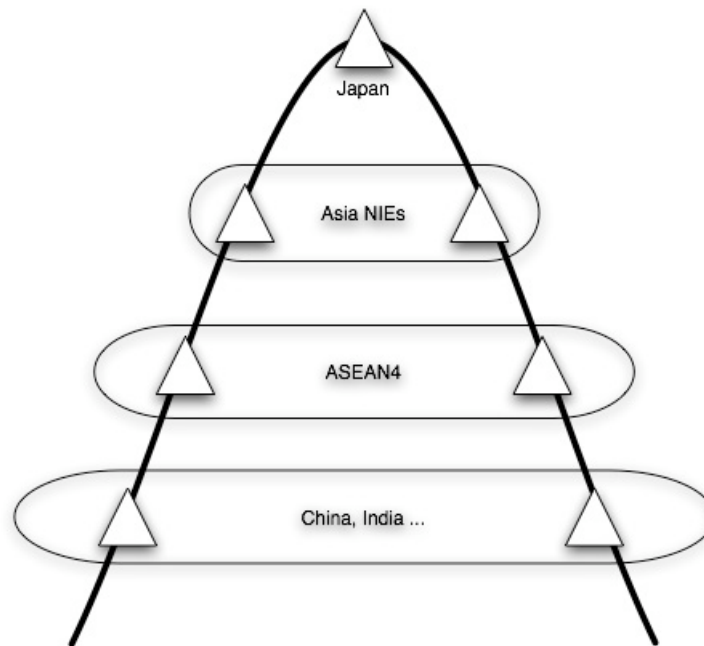
The division of labor in the Pacific region has aptly been called the FG<sup>1</sup> pattern of development. (. . .) Traditionally, there have been two patterns or types of international division of labor: the vertical division of labor such as prevailed in the 19th century to define relations between the industrialized country and the resource-supplying country or between the suzerain and the colony; and the horizontal division of labor typified by the EEC with its trade in manufactures among industrialized countries, often among countries at the same stage of development and sharing a common culture. By contrast with both of these types, the FG pattern represents a special kind of dynamism. In the Pacific region, for example, the United States developed first as the lead country. Beginning in the late 19th century, Japan began to play catch-up development in the non-durable consumer goods, durable consumer goods, and capital goods sectors in that order. Now the Asian NICs and the ASEAN countries are following in Japan's footsteps. (. . .) Because there is such great variety in the Asian nations stages of development, natural resource endowments, and cultural, religious, and historical heritages, economic integration on the EEC model is clearly out of the question. Yet it is precisely this diversity that works to facilitate the FG pattern of shared development as each is able to take advantage of its distinctiveness to develop with a supportive division of labor (Okita, 1985, p. 21).

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<sup>1</sup> FG stands for Flying Geese.

Okita's speech triggered much interest in the Flying Geese Model and it seems East Asia had actually developed as Okita described (at least before the Asian Currency Crisis in 1997-1998). The Flying Geese pattern of economic development, as described by Okita, may be seen in Figure 1.

**Figure 1: Famous Flying Geese Pattern of Economic Development in East Asia**



Okita's description was based on Akamatsu (1962) and applied to the actual economic situation in East Asia around the middle 1980's. On the other hand, the original Flying Geese Model in Akamatsu (1935, 1937) is significantly different from this version. There are actually two significantly different concepts of the Flying Geese Model. One is applied to the pattern of economic development in one specific country, and the other is applied to the pattern of economic development of multiple countries in sequence.<sup>2</sup>

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<sup>2</sup>Aside from the original Akamatsu (1935, 1937, 1962) articles, Kojima (2000) provides the most comprehensive review of the variants of the Flying Geese Model. This chapter is primarily based on the literature of these two scholars.

## 2.1 One-Country Model

The basic pattern of Flying Geese appeared in Akamatsu (1935, 1937) and is named here as the "one-country" model. There are two versions of the one-country model. One is the "one-country - one-product" model and the other is the "one-country - multi-product" model.

### 2.1.1. *One-country one-product model*

The "One-country - one-product" model explains a historical pattern of the development of an industry in a country from the viewpoint of import, export, and production of one specific product. Akamatsu explained this basic pattern as follows:

Wild geese fly in orderly ranks forming an inverse V, just as airplanes fly in formation. This flying pattern of wild geese is metaphorically applied to the below figured three time-series curves each denoting import, domestic production, and export of the manufactured goods in less-advanced countries (Akamatsu 1962, p. 11).

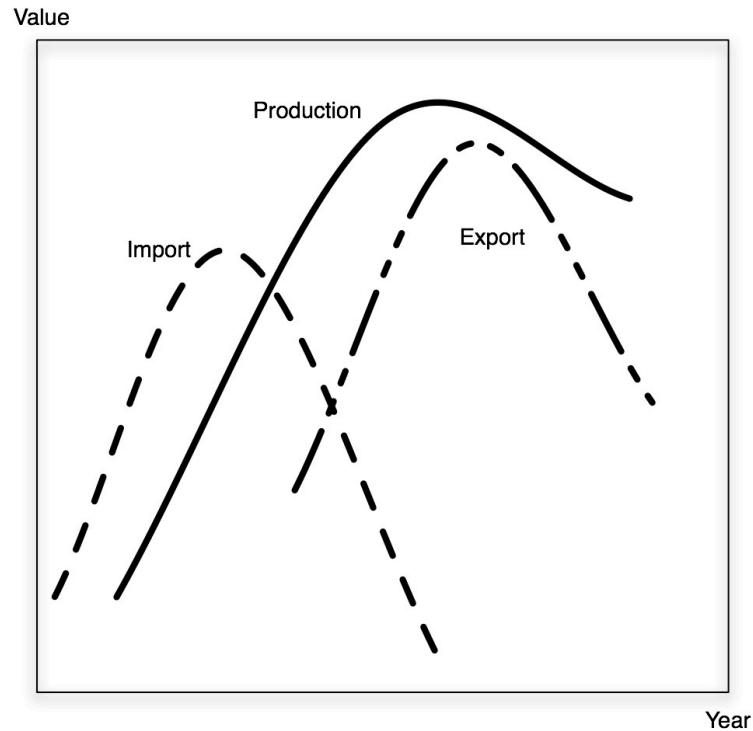
The figure that Akamatsu mentioned above is just like Figure 2. It differs from the "flying geese" described by Okita (Figure 1), but this is the origin of the Flying Geese pattern of economic development<sup>3</sup>. Akamatsu (1962, p. 12) called this the "fundamental wild-geese-flying pattern."

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<sup>3</sup>It is quite confusing to refer to both the original one-country version and the famous multi-country version as "Flying Geese."



**Figure 2: Akamatsu's "Fundamental" Flying Geese Pattern of Economic Development**



Akamatsu (ibid) explained the “fundamental pattern” of the Flying Geese Model in the following four stages:

- Stage 1: Import of manufactured consumer goods begins.
- Stage 2: Domestic industry begins production of previously imported manufactured consumer goods while importing capital goods to manufacture those consumer goods.
- Stage 3: Domestic industry begins exporting manufactured consumer goods.
- Stage 4: The consumer goods industry catches up with similar industries in developed countries. Export of the consumer goods begins to decline, and capital goods used in production of the consumer goods are exported.<sup>4</sup>

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<sup>4</sup>Akamatsu mentions “multi-industry” ingredients in the fourth stage, but this concept is dealt with separately in the next subsection for simplicity.

Akamatsu's "fundamental" model is based on the case of Japan's industrial development, specifically industries involving cotton yarn and wool. He provides statistical evidence to support the Flying Geese pattern and completes a picture of import, production, and export in Japan's cotton yarn and wool industries from the 1860's to the 1930's (Akamatsu 1935, 1937).

### *2.1.2. One-country multi-product model*

Akamatsu expanded the one-country - one-product model to the one-country - multi-product model in his first paper on the Flying Geese Model (Akamatsu 1935). He compared the above one-country - one-product pattern of industrial development between the cotton yarn industry and the wool industry relative to final goods, intermediate goods, and capital goods within each industry. He found that there are sequential patterns in economic development both between and within industries.

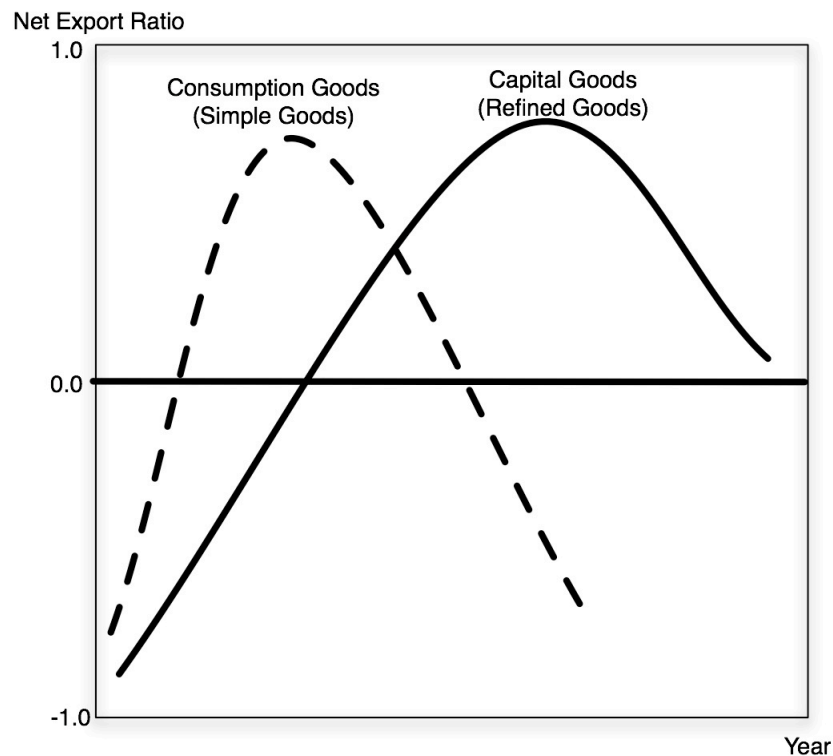
Later, he generalized this pattern indicating that "the time for the curves of domestic production and export to go beyond that of import will come earlier in crude goods and later in refined goods, and similarly, earlier in consumer goods and later in capital goods" (Akamatsu 1962, p. 11).

Figure 3 is based on the above description<sup>5</sup>. The vertical axis is the "net export ratio" of goods instead of the three lines of import, production, and export found in Figure 2. This may be called the "Flying Fish" diagram of industrial development; the inverse-V shape crosses the horizontal axis twice, metaphorically just like flying fish jumping from the surface of the sea and then sinking below again.

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<sup>5</sup> Kosai and Tran (1994) also explain the Flying Geese Model based on similar figures to those in Figure 3. They set the vertical axis as the "production/consumption ratio." Kwan (2002) sets it as "competitiveness."

Figure 3: Flying Fish Diagram of Industrial Development for a Country



### 2.1.3 Mechanism behind the one-country - multi-product model

One problem of the Flying Geese Model relates to the fact that Akamatsu did not explain the mechanism behind the pattern using terminology of neo-classical economics. He referred to his model as “a historical theory” (Akamatsu 1962, p. 11).” Kojima (1960) offered the explanation that the accumulation of capital (the Heckscher-Ohlin factor) is the fundamental driving force of the Flying Geese Model. Kojima (2000) further mentioned the Ricardian advantage by learning-by-doing and economies of scale as a driving force.

## 2.2 Multi-Country Model

### 2.2.1. Multi-country - multi-product model

While the Akamatsu model focused on the industrial development of a country, the theory was fundamentally structured around the existence of countries that are in different development stages. Thus, the Flying Geese Model can naturally be extended

to a multi-country model. He explicitly proposed a multi-country model as “Development of Advanced and Less-Advanced Countries in a Wild-Geese-Flying Pattern” (1962, p. 17). This multi-country model, as in Figure 1, is now well known as “The Flying Geese Model” as though it were the ultimate such model.

### *2.2.2. Mechanism behind multi-country - multi-product model*

Actually, Akamatsu’s Flying Geese model was a building block for his larger theory of the historical development of the world economy, driven by country based iterant “heteronization” and “homogenization.” The theory is meticulous but descriptive (see Akamatsu 1962) and not integrated into the theories of mainstream international economics. Later, Fujita and Mori (1999) tried to reproduce the multi-country - multi-product Flying Geese pattern of economic development using a simulation model of spatial economics (new economic geography).

## **3 Empirical Evidence**

Empirical studies have been conducted to verify the Flying Geese Model. Kojima (2000) provides a comprehensive review of these studies. Kwan (2002) checked the relationship between Japan and China to determine whether or not it is still one of “flying-geese” or has changed to a metaphorical “leaping-frog” by U.S. trade statistics. He concludes that exports of Japan are still more “high-tech” than those of China in 2000.

### **3.1 One-Country Model**

The one-country multi-product model may be checked relative to the Flying Fish diagram. Below, diagrams for Thailand, Korea, and Japan from the 1960’s to 2005 have been drawn using the COMTRADE database by UNCTAD. Development of the clothing industry (SITC rev.1: 841), textile, yarn, and thread industry (651), passenger car industry (7321) and iron and steel industry (674) may be seen. These four industries are selected based on the typology described in Table 1.

Table 1: Types of Selected Industries

	Light Industry	Heavy Industry
Up Stream	Textile	Iron and Steel
Down Stream	Clothing	Passenger Car

Interpretations of Akamatsu predictions on the order of industrial development are that light industries develop first followed by heavy industries. Downstream industries come first, and then upstream industries follow. Unfortunately, it is not possible to check these predictions for a single country; coverage of the COMTRADE database, about fifty years, is too short to check the Flying Geese pattern of economic development<sup>6</sup>. To overcome this problem, the diagram for Thailand may be assumed to be similar to that of Japan in its “take-off” stage of economic development. That for Korea may be assumed to be similar to that of Japan a few decades ago. Thus, figures for Thailand-Korea-Japan may be assumed to be figures for the sequential development stage of a hypothetical single country.

Figure 4 includes the Flying Fish diagram for Thailand. It shows that: (1) the clothing industry developed first followed by the textile industry, (2) the passenger car industry came first, and then the iron and steel industries followed, and (3) clothing and textile industries developed earlier than passenger car, iron, and steel industries. This diagram closely matches hypotheses (a) and (b) of Akamatsu.

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<sup>6</sup> Akamatsu used 80 to 100 years of trade data for Japan in order to depict the Flying Geese pattern.

Figure 4: Flying Fish Diagram for Thailand

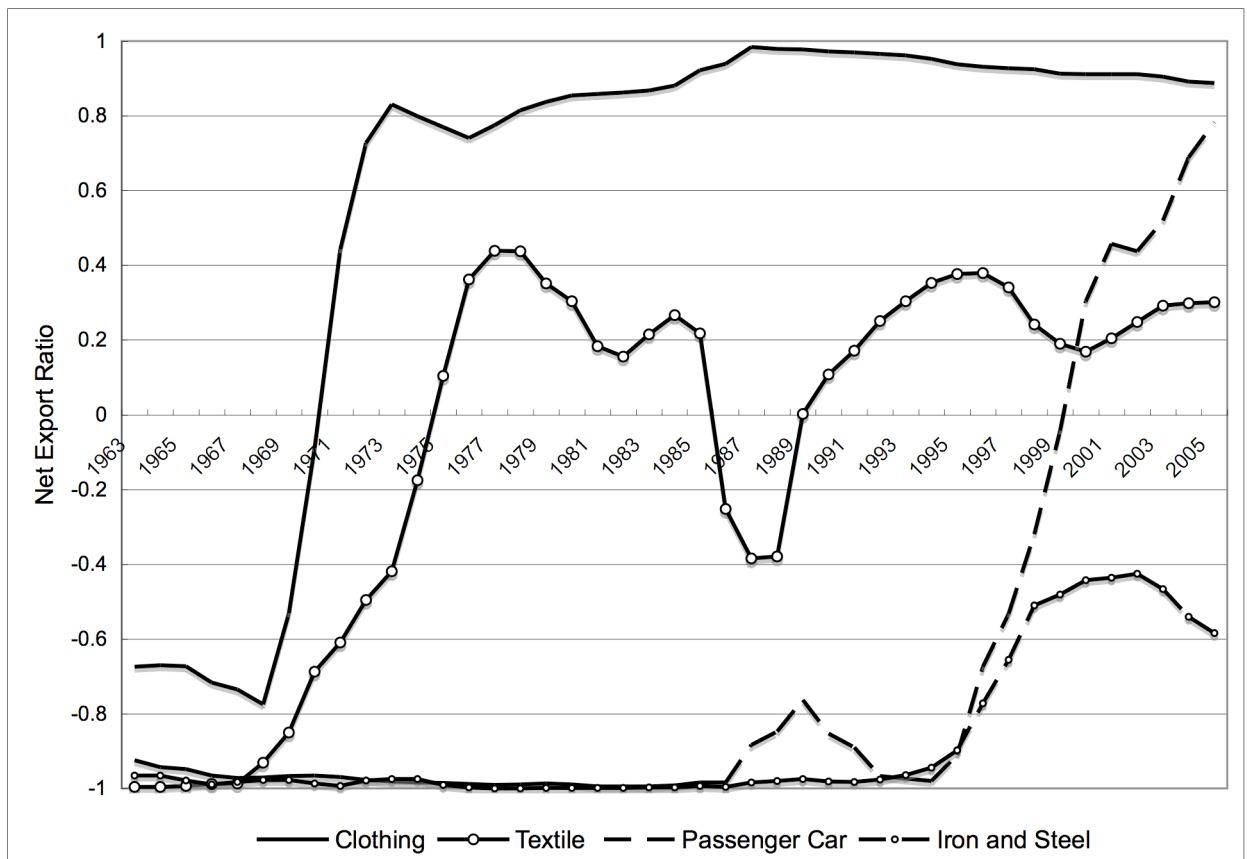


Figure 5 shows the Flying Fish diagram for Korea. It indicates that: (1) the clothing industry had already developed in the 1960's and declined during the 1990's, (2) the textile industry followed the clothing industry but started declining before the clothing industry, and (3) iron and steel industries developed before the passenger car industry but soon caught-up.

The Korean case diverges from Akamatsu predictions in an interesting way. Upstream industries do not always follow downstream industries in a steady manner. Sometimes upstream industries are not fully-developed and decline before downstream industries.

Figure 5: Flying Fish Diagram for Korea

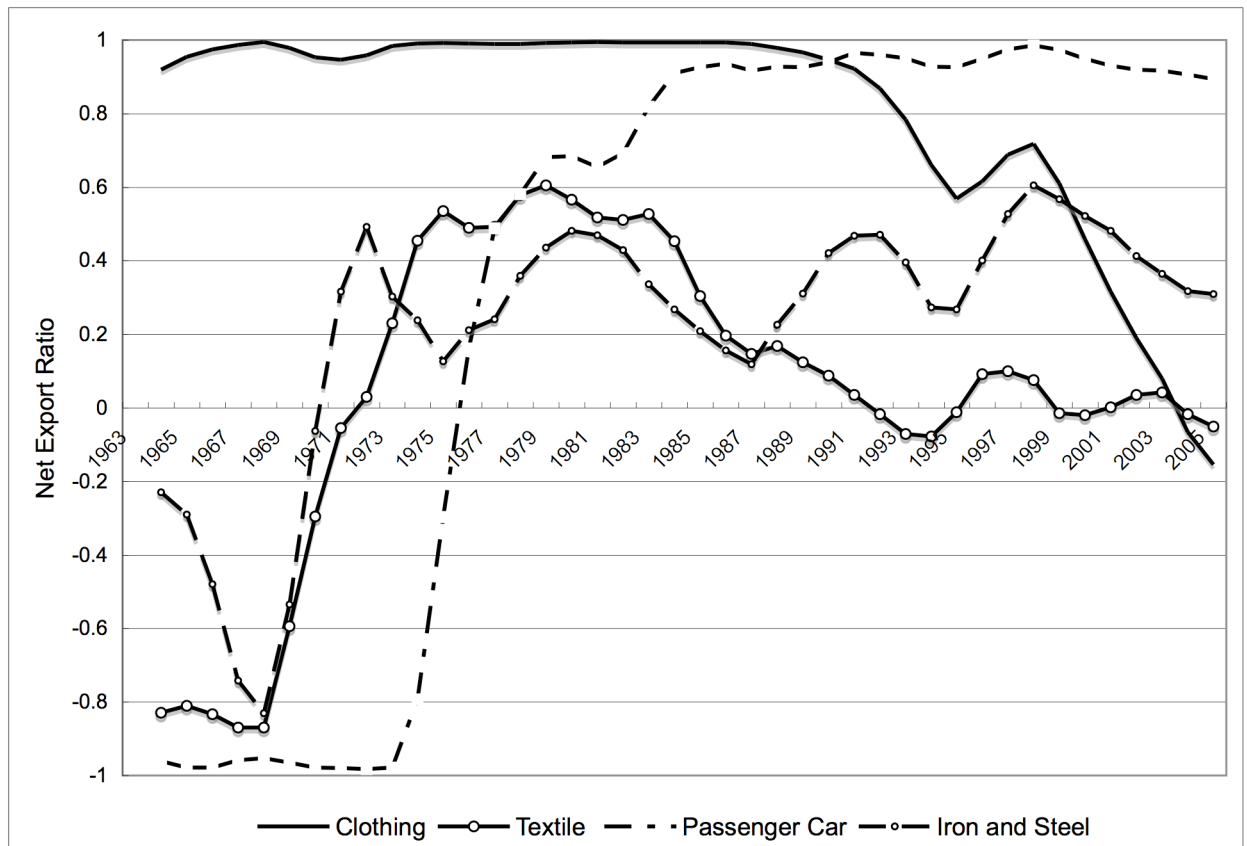
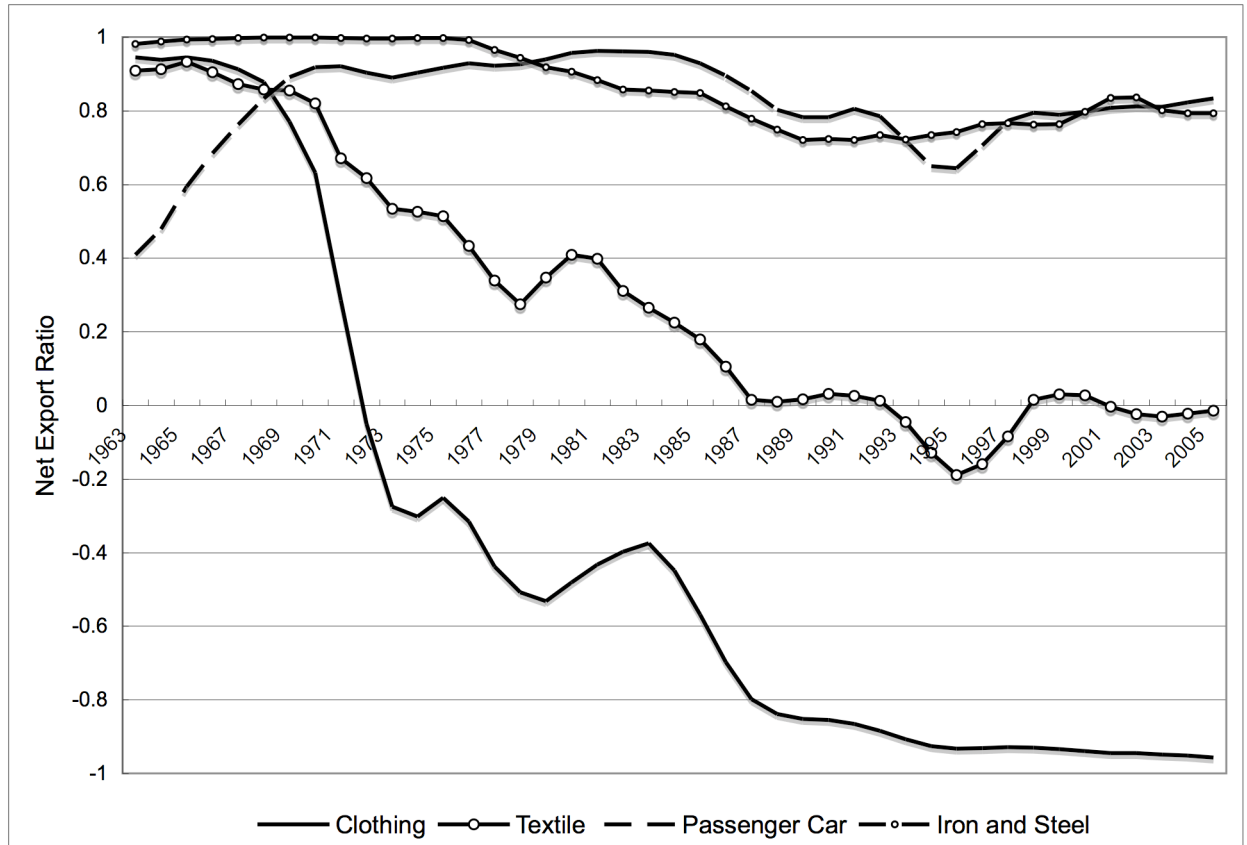


Figure 6 contains the Flying Fish diagram for Japan. It shows that: (1) the clothing industry declined earlier than the textile industry and (2) iron and steel industries developed earlier than the passenger car industry.

Japan's case also differs from Akamatsu's predictions in an interesting way. Upstream heavy industries of iron and/or steel developed earlier, and downstream industries (passenger cars) followed.

Figure 6: Flying Fish Diagram for Japan



Because Figures 4, 5, and 6 are for three countries, not one country, the analysis is not an exact check of the validity of Akamatsu's "one-country - multi-product" model. However, findings of this quasi-one-country analysis show pros and cons for his "one-country" Flying Geese Model quite clearly.

First, light industries seem to develop earlier than heavy industries. This fact follows an Akamatsu prediction that development occurs "earlier in crude goods and later in refined goods." Akamatsu does not explicitly explain what the driving-force for a country is to upgrade its product from crude to refined. Later, Kojima (1960) explained this using H-O theory with some Ricardian ingredients. It is reasonable to think that less-developed countries begin industrialization from labour intensive goods and then move into more capital intensive industries with the accumulation of capital in the country.



Second, upstream industries do not always follow downstream industries. In some countries, upstream industries do not develop sufficiently, and in other countries, upstream industries develop earlier than those downstream. This tendency is especially obvious in heavy industries. This fact is contrary to another Akamatsu prediction, that development occurs “earlier in consumer goods and later in capital goods.” Akamatsu’s “fundamental” Flying Geese Model is that industrialization is driven by domestic demand, or driven by backward linkage. In the case of Japan’s cotton and wool industry, a large market ensured the development of the consumer industry first, and the demand from that consumer industry fostered the intermediate or capital industry later. However, there are less-developed countries which do not have enough large markets to foster upward industries. In addition, industrialization driven by domestic supply, or that driven by forward industry, is also a reasonable route for economic development. The industrial revolution in England is a typical case. Invention of the steam engine enhanced various industries that used the engine as a capital good. Japan’s iron and steel industry is another example.

All in all, industrial development from crude to more elaborate goods is quite robust. Industrialization driven by backward linkage is also valid, but it is not “the” way but “a” way of industrial development.

### **3.2 Multi-Country model**

Next, the multi-country - multi-product model was checked using the correlation of export structures between Japan and other countries. Japan may be assumed to be the leading goose. Countries that have an export structure similar to Japan are more advanced as “flying geese”. Correlations of the export structure of 8 countries (ASEAN 5 + China, Korea, and Taiwan) with Japan in 1985, 1990, 1995, and 2000 were compared using the 24-sector Asian International IO Table.

In 1985, the order of the flying geese was clear. Japan was the leading goose, and Taiwan and Korea followed. Then the ASEAN 5 and China came. However, following geese had caught-up by 2000, and the slope of the flying geese became flatter. It seems that the Flying Geese pattern of economic development in East Asia changed

dramatically from 1985 to 2000, and Japan is not now the sole leading goose in the region.

Figure 8 shows the same picture except for the machinery sector, mainly consisting of the electronics industry. This picture is quite different from Figure 7. The order and slope of the Flying Geese pattern in East Asia has changed little in the last two decades. This result is understandable. The development of the electronics industry in East Asia is quite different from the pattern assumed in the 70-year-old Akamatsu Flying Geese Model. The development of the electronics industry in East Asia, especially after the 1970's, was based on “off-shore” transactions through Free Trade Zones (FTZ's). This is fundamentally different from the market-driven industrial development in Japan which was the base of the Akamatsu model.

Figure 7: Correlation of Export Structure with Japan

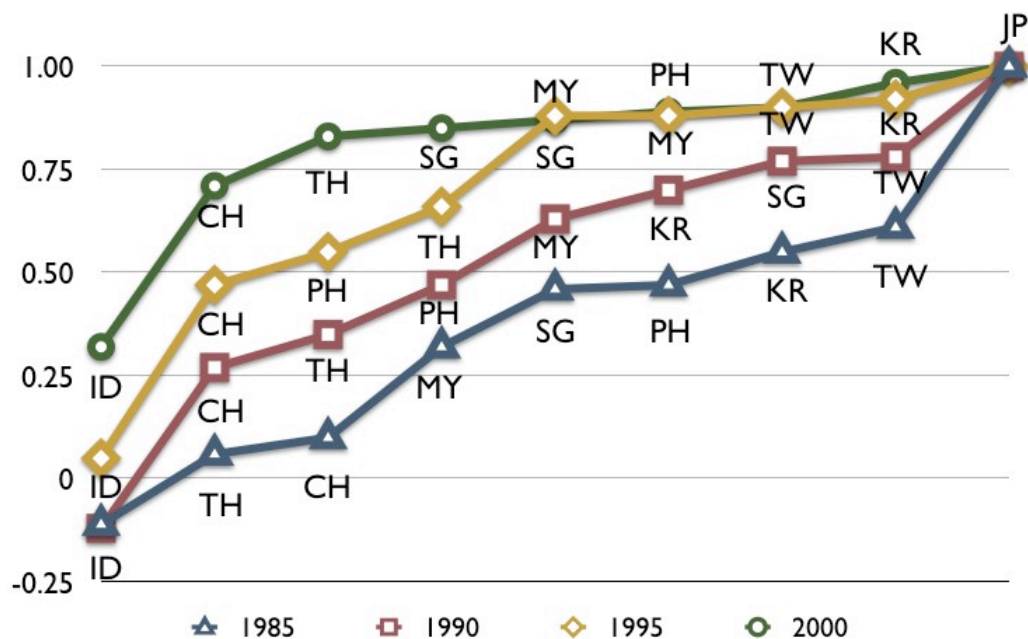
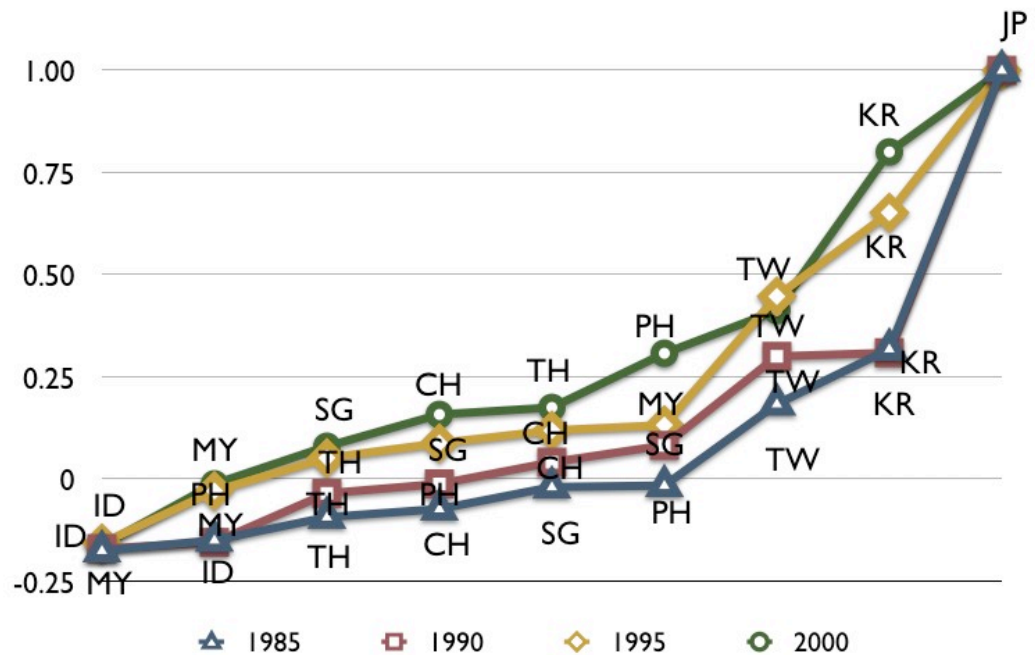


Figure 8: Correlation of Export Structure with Japan (Excluding the Machinery Sector)



#### 4. Conclusions

More than 70 years ago, Akamatsu discerned a general pattern of industrial development and international trade based on the case of Japan and called it the Flying Geese Model. This phrase is now generally used to depict the sequential development of a group of countries, and the concept is sometimes thought to be “obsolete.” However, Akamatsu clearly stated that “these countries, advanced and less advanced, do not necessarily go forward at the same speed in their development of a wild-geese-flying pattern, nor do they always make gradual progress, but they are at times dormant and at other times make leaping advances (Akamatsu 1962, p. 18).”

In some ways, it is regrettable that Akamatsu used only the one term “Flying Geese” to refer to various models in his grand theory of the history of world economic development. However, since the phrase “Flying Geese” seems to fit the model depicted in Figure 1 so well, and since such nomenclature is now so popular, it is virtually impossible to rename. On the other hand, model versions of the concept seen in

Figures 2 and 3 have not drawn much attention, although the “fundamental” Flying Geese Model contains many research questions yet answered. For example:

- Why do traces of the development of so many industries follow the “fundamental” Flying Geese pattern? What is the mechanism behind it?
- Why do some products seem to follow a “fundamental” Flying Geese pattern for a very short period, while others take much longer?
- What affects the shape of the “fundamental” Flying Geese pattern? Is it trade policy, market size, or technological attributes?

For the last two decades, the Flying Geese Model may have drawn too much attention relative to the “order” and “slope” of the depicted Flying Geese. Now, in the era of economic integration in East Asia, interest in the “fundamental” Flying Geese pattern of industrial development must be renewed. However, for such a revival to occur, nomenclature other than the “fundamental” Flying Geese model may need to be developed.

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